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C. J. Lee
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Fujimoto et al.
Serial No.: 09/857,382
Filed: July 23, 2001
Group Art Unit: 1775
Examiner: Piziali, Andrew T.
Confirmation No. 4726
Title: "HYDROPHILIC MEMBER"

APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

In connection with the subject application, and further to the Notice of Appeal dated May 27, 2003, please enter this Brief on Appeal pursuant to 37 CFR 1.192.

REAL PARTY IN INTEREST

The real parties in interest are the owners/assignees of the application, which are TOTO, LTD. and NIPPON SHEET GLASS CO. LTD.

RELATED APPEALS AND INTERFERENCES

None.

STATUS OF CLAIMS

Claims 1-20 are all of the claims which have ever been in the application, all of which claims

2 and 11 have been cancelled, so that claims 1, 3-10 and 12-20 remain pending, of which claim 1 is independent. In the final Office Action dated November 26, 2002, all of the pending claims have been rejected as being allegedly unpatentable over certain references applied by the Examiner. Appellant appeals the rejections of claims 1, 3-10 and 12-20. A copy of claims 1, 3-10 and 12-20 on appeal is attached hereto as an Appendix.

STATUS OF AMENDMENTS

Subsequent to the Final Rejection, appellant submitted an Amendment-C Under 37 CFR 1.116, dated April 25, 2003, which has been entered.

Also, appellant submitted a Revised Amendment-C Under 37 CFR 1.116, dated May, 27, 2003, which was substantially the same as the earlier Amendment-C Under 37 CFR 1.116 except that the dependencies of claims 14, 15, 17 and 20 were changed to claim 1 because claim 2 was cancelled in the Amendment-C Under 37 CFR 1.116 (the subject matter of claim 2 was incorporated into claim 1). The Revised Amendment-C Under 37 CFR 1.116 was not entered by the Patent Office, as indicated in an Advisory Action dated June 16, 2003.

Finally, appellant has very recently submitted an Amendment-D Under 37 CFR 1.116, dated July 28, 2003, in which appellant is, again, simply desiring to change the dependency of claims 14, 15, 17 and 20 to claim 1, rather than cancelled claim 2, for consistency. It is believed that Amendment-D Under 37 CFR 1.116 will be entered in the application.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a hydrophilic member such as a glass or mirror substrate having superior hydrophilic restoration properties (resistance to washing with soap), which results in improved, long term anti-fogging properties. See page 1, lines 4-5 and page 2, line 11 – page 3, line 3 of the specification.

Description of the Related Art

Japanese Unexamined Patent Publication Numbers Hei 9-278431, Hei 9-295363, Hei 10-36144, and Hei 10-231146 are known as background art having hydrophilic and anti-fogging properties on the substrate surfaces of glass and the like.

Japanese Unexamined Patent Publication Number Hei 9-278431 discloses the application, on a substrate surface, of a surface treatment agent including phosphoric acids or salts thereof, soluble aluminum compounds, water-soluble silicates, surface-active agents, and solvents. The mean surface roughness of the hydrophilic film is 0.5 to 500 nm. Japanese Unexamined Patent Publication Number Hei 9-295363 discloses a film of titanium oxide or tin oxide formed on a substrate surface, having a mean surface roughness of at least 1 μm . Japanese Unexamined Patent Publication Number Hei 10-36144 discloses a photocatalyst film such as titanium oxide (TiO_2) formed on a glass substrate surface and a porous inorganic oxide film such as silicon oxide (SiO_2) formed on the surface of the photocatalyst film. Japanese Unexamined Patent Publication Number Hei 10-231146 discloses an alkali barrier film and a photocatalyst film formed on the surface of a glass substrate. The mean surface roughness of the photocatalyst film is from 1.5 to 80 nm.

The art disclosed in the above-mentioned Japanese Unexamined Patent Publication Number Hei 9-278431 is not practical since both the chemical durability and wear resistance of the hydrophilic film are low. The art disclosed in the above-mentioned Japanese Unexamined Patent Publication Number Hei 9-295363 is not applicable to the surface of a transparent substrate such as a glass plate because the mean surface roughness (R_a) of the hydrophilic film is greater than or equal to 1 μm , preferably greater than or equal to 4 μm , and the transparency thereof is low (high haze). With regards to the art disclosed in Japanese Unexamined Patent Publication Number Hei 10-36144, since wear resistance of the hydrophilic film is low because of the porosity thereof, hydrophilic function thereof is lost and is not easily recovered when contamination such as oil enters into the pores. With respect to the art disclosed in Japanese Unexamined Patent Publication Number Hei 10-231146, time is needed for production because the hydrophilic film is formed of a plurality of layers.

Moreover, with each of the above-disclosed background arts, a hydrophilic film is formed on the surface of a substrate and hydrophilic properties are further improved by making the surface

have minute irregularities. However, in the case of a contaminated substrate, there is a drawback of slow restoration of the hydrophilic properties after washing of the substrate surface with a detergent. For example, since a surface such as that of a windshield or a mirror provided with a lavatory is easily contaminated, it is frequently washed with a detergent. Unfortunately, restoration of hydrophilic properties after washing is slow, leading to minute water drops easily adhering to the surface and anti-fogging properties fade.

The Present Invention

The present invention has been developed to overcome the limitations and disadvantages attendant the discussed conventional art. See page 2, lines 2-5 of the specification.

With reference to Figs. 1(a), 1(b) of the present drawings there are disclosed two embodiments of the present invention, in which the embodiment of Fig. 1(b) includes an undercoat film 4 but is otherwise very similar to the embodiment of Fig. 1(a). According to the invention, there is provided

a hydrophilic member comprising:

a tin oxide layer (2) having a rutile structure formed on a surface of a substrate (1); and

an overcoat layer (3) formed on the surface of the tin oxide layer, wherein the overcoat layer has a surface polarity opposite to that of tin oxide, is selected from at least one of silicon oxide, aluminum oxide, zirconium oxide, ceric oxide, and titanium oxide, and the mean surface roughness (R_a) of the top surface thereof is within a range of 0.5 to 25 nm.

Such hydrophilic member according to the invention, corresponding to claim 1, is very advantageous, again, having superior hydrophilic restoration properties (resistance to washing with soap) and improved, long term anti-fogging properties.

If only a tin oxide (SnO_2) layer is formed on the surface of the substrate and the surface of this tin oxide (SnO_2) layer is rough, hydrophilic properties are displayed, as mentioned in Unexamined Patent Publication Number Hei 9-295363. Unfortunately, upon washing the surface once with bath soap, the contact angle with water becomes 70° to 80° . On the other hand, when a thin film such as a film of silicon oxide (SiO_2) is formed on the surface of the above-mentioned tin oxide (SnO_2) layer, the post-washing contact angle with water becomes less than 10° . It is conceivable that the reason is because super-hydrophilic properties are present after washing since, from the aspect of surface polarity, tin oxide (SnO_2) and silicon oxide (SiO_2) have opposite

polarities and bath soap is anionic.

Further, by making the tin oxide (SnO_2) layer (2) to have a rutile structure, it is possible to form a polycrystalline thin film having a surface of preferable irregularities. Moreover, by making the mean surface roughness (R_a) of the tin oxide (SnO_2) layer to be from 0.5 to 25 nm these irregularities are transferred to the top surface of the overcoat layer (3), such that it is possible to conveniently make the mean surface roughness (R_a) of the top surface to be from 0.5 to 25 nm.

It is not preferable that the mean surface roughness (R_a) be less than 0.5 nm, because effective irregularities which improve long-term maintainability of hydrophilic properties and functions would not be formed. It is also not preferable for the mean surface roughness (R_a) to exceed 25 nm, in which case irregularities would be too great and transparency lost, or the long-term stability of the hydrophilic function would be lowered. See page 3, line 4 - page 4, line 3 of the specification.

According to other aspects of the invention, the mean spacing (S_m) of the irregularities is from 4 to 300 nm (claim 4), the thickness of the tin oxide film or layer (SnO_2) is from 10 to 800 nm (claims 5, 17, 18), the thickness of the overcoat layer of silicon oxide film (SiO_2) or the like is from 0.1 to 100 nm (claims 6, 19 and 20), and an undercoat film is disposed between the surface of the substrate and the tin oxide layer to act as a barrier against alkali (claim 12).

It is not preferable for the mean spacing (S_m) of the irregularities to be either less than 4 nm or greater than 300 nm, which would result in reduction of the long-term stability of hydrophilic performance and anti-fogging performance. It is preferable for the thickness of the tin oxide film or layer (SnO_2) to be from 10 to 800 nm, and for the thickness of the overcoat layer of silicon oxide film (SiO_2) or the like to be from 0.1 to 100 nm. When the thickness of the tin oxide is less than or greater than this range, the desired irregularities cannot be obtained. That is, deviation outside of this range is not preferable because, when the thickness of the tin oxide is smaller than this range, then a film of uniform thickness will not be realized; and when the thickness of the tin oxide is larger than this range, then the spacing of irregularities will become too large. Page 4, line 4 – Page 5, line 15 of the specification

A film mainly comprised of common silicon oxide is preferable as the undercoat for the alkali

barrier. Additives such as P (phosphorous) and B (boron) may be added, and oxide compounds of tin oxide may be used as needed. The undercoat film for the alkali barrier is at least 10 nm yet not greater than 300 nm. A thickness less than 10 nm is not preferable because it is insufficient for producing an effective alkali barrier. Additionally, a thickness greater than 300 nm is not preferable because interference colors frequently become noticeable and it becomes difficult to control the optical characteristics of a glass plate. Page 5, lines 16-23 of the specification

ISSUES ON APPEAL

I. Whether the hydrophilic member as defined by each of rejected claims 1, 3-7 and 9-20 is unpatentable under 35 USC 103(a) based on US Patent 6,379,776 (Tada et al.) in view of US Patent 5,854,708 (Komatsu et al.), as proposed by the Examiner?

II. Whether the hydrophilic member as defined by rejected claims 8 is unpatentable under 35 USC 103(a) based on US Patent 6,379,776 (Tada et al.) in view of US Patent 5,854,708 (Komatsu et al.) and further in view of US Patent 5,605,609 (Ando et al.), as proposed by the Examiner?

GROUPING OF CLAIMS

The claims on appeal do not stand or fall together. Rather, each of the claims on appeal stands or falls on its own merits under the Issue above, as understood from the arguments presented hereinbelow.

ARGUMENTS

¹ In the final Office Action the Examiner also presented a rejection of claims 11 and 13 under 35 USC 112, first paragraph, and a rejection of claims 2 and 11 under 35 USC 112, second paragraph, but such rejections are believed to be overcome by claim modifications presented in Amendment-C Under 37 CFR 1.116 and Amendment-D Under 37 CFR 1.116, as understood from the Examiner's comments in Advisory Actions dated May 15 and June 16, 2003.

The References

US Patent 6,379,776 (Tada et al.) discloses nonfogging and stainproof glass articles having an alkali shut-off film and a photocatalytic film in the order laminated on the surface of glass substrate, in which dents and projections having an arithmetical mean roughness (Ra) from 1.5 to 80 nm and mean interval (Sm) of dents and projections from 4 to 300 nm are formed thereon, and a photocatalytic layer thickness of 10 -500 nm. Additionally, Tada applies a silicon oxide monocomponent equivalent layer or similar layer over TiO_2 to prevent organic substances from being adhered to the TiO_2 layer because the silicon oxide monocomponent equivalent layer or similar layer "... are nonpolar or has low polarity...." The anti-fogging and stain-prevented glass articles can be used for window glasses of automobiles and buildings, and glasses, etc.

Significantly, Tada does not indicate SnO_2 as a photocatalyst, but instead identifies TiO_2 , ZnO , ZnS , WO_3 , Fe_2O_3 , GaAs , CdSe , GaAsP , Cds , SrTiO_3 , GaP , In_2O_3 or MoO_3 for use as a photocatalyst. Tada specifically emphasizes that TiO_2 is the photocatalyst which is most widely utilized at present in view of high photocatalytic activation and chemical stability, and it is the photocatalyst specifically discussed throughout the patent. Moreover, Tada discloses that the surface irregularities of his photocatalytic film are achieved either by transfer through of the surface irregularities of the alkali shut-off film or by directly forming irregularities on the photocatalytic film surface through special treatment methods.

US Patent 5,854,708 (Komatsu et al.) discloses an anti-fogging element including a transparent substrate such as a glass substrate, a transparent film of a photocatalyzer such as TiO_2 catalyzing a photocatalytic reaction on the transparent substrate, and a film of a transparent porous inorganic oxide such as SiO_2 formed on the film of the photocatalyzer and having a surface exhibiting a hydrophilic property due to its porosity. According to Komatsu, organic

matters etc. deposited in openings of the porous inorganic oxide film are dissolved and removed by a photocatalytic reaction caused by light excitation of the photocatalyzer film whereby the anti-fog property of the anti-fog element can be maintained over a long period of time. Komatsu, like Tada, prefers use of TiO_2 as the photocatalyst, but mentions that other semiconductors may be used such as ZnO , SnO_2 , ZnS and CdS . According to Komatsu, organic matters such as wax and NO_x which are deposited in openings of the porous inorganic oxide film are dissolved and removed by the photocatalytic reaction caused by the photocatalyzer film. Accordingly, a decrease in the hydrophilic property is prevented and the anti-fog property can be maintained over a long period of time.

US Patent 5,605,609 to Ando et al. discloses a film comprising silicon dioxide as the main component, which contains Zr, or another material such as Ti, Ta, Hf, Mo, W, Nb, Sn, In, La and Cr as a secondary component, and a method for forming it by reactive DC sputtering. It makes it possible to form reflection preventive films, alkali barrier films and various multi-layered films such as multi-layered films for anti-iridescent glass, which contain said film comprising silicon dioxide as the main component, by a physical vapor deposition method without breaking a vacuum.

The Rejections

Issue I. As set forth at item 4 (and further discussed in items 6 and 7) of the final Office Action, claims 1-7 and 9, 10, 12 and 14-20 are rejected under 35 USC 103(a) as being unpatentable over Tada et al. in view of Komatsu et al. It is the Examiner's that: Tada discloses most of the features of the claimed invention in relation to his nonfogging and stain proof glass articles, except that Tada's articles use titanium dioxide rather than rutile tin oxide as a photocatalytic layer, his article is not disclosed as being a mirror, and he does not disclose the

claimed thickness range for the SiO₂ overcoat layer; it would have been obvious to one having ordinary skill in the art at the time of the invention was made to use tin oxide as the photocatalyst layer of Tada because it is functionally equivalent to TiO₂ because both materials function as photocatalysts, as taught by Komatsu, whereas tin oxide has a rutile structure; it would have also been obvious to one having ordinary skill in the art at the time of the invention was made to apply Tada's teachings to a mirror based on the teachings of Komatsu; while Tada does not disclose a specific thickness range for the SiO₂ overcoat layer, the claimed thickness range would have been obvious as a matter of discovering an optimum value of a result effective variable using routine skill, and also based on the teaching of Komatsu regarding the thickness of his porous, hydrophilic overcoat layer.

Issue 2. As set forth at item 5 of the final Office Action, claim 8 stands rejected under 35 USC '103(a) as being unpatentable over the Tada and Komatsu references as applied above and further in view of Ando et al. Specifically, it is the Examiner's position that it would have also been obvious to persons skilled in the art at the time of the invention to substitute in Tada an alkali barrier oxide film containing both silicon and tin based on Ando's teachings.

Appellant's Arguments

Issue I. Upon careful consideration appellant respectfully traverses the Examiner's rejection of claims and submits that each of present claims 1, 3-7, 9, 10 and 12-20 is clearly patentably distinct over the Tada, and Komatsu, based on the following.

1. *The Claimed Invention is Fundamentally Different From Both Tada and Komatsu*

Initially, appellant respectfully submits that the claimed invention is not disclosed or suggested by the applied references, whether considered singly or in combination, and achieves a significant advantage which is not achieved or suggested by the applied references, i.e., superior hydrophilic restoration properties (resistance to washing with soap), which results in improved, long term anti-fogging properties.

According to claim 1, an overcoat layer is formed on the surface of a tin oxide layer, the overcoat layer is made from a material having an *opposite polarity with respect to tin oxide from the aspect of surface polarity*, and the tin oxide layer has a rutile structure which having preferable surface irregularities, and that transfer through to the overcoat layer giving it a favorable surface roughness. Such combination of the tin oxide layer with a rutile structure (which achieves the desirable surface irregularities without any special or additional processing) and the overcoat layer with opposite surface polarity and the favorable surface roughness improves the hydrophilic restoration properties of the tin oxide layer, and it becomes possible to obtain long-term stability of the hydrophilic properties.

In this regard, it should be noted that the rutile structure of the tin oxide makes it possible to easily form a polycrystalline film having a surface of preferable irregularities, quite unlike the TiO_2 layer of Tada, in which appropriate denting and projecting is achieved only via special processing as discussed at his column 9, lines 7-67, or by being transferred through from the alkali shut-off layer (to any extent that the shut-off

layer is present). It should also be noted that SnO₂ shows little photocatalytic properties as practical matter, especially in comparison to TiO₂, and that rutile titanium dioxide is recognized as having *inferior* photocatalytic properties in comparison to anatase titanium dioxide.

From the viewpoint of only surface irregularities, it would seem that the tin oxide layer could achieve long term stability of the hydrophilic properties. However, since the surface of the tin oxide layer is electropositive, the anionic soap easily adheres thereto. Specifically, the anionic soap adheres to the tin oxide layer with the negative portion (the hydrophilic portion) of the anionic soap attracted to the tin oxide layer, and the hydrophobic portion of the anionic soap is exposed on the surface. As a result of this, it is difficult to keep the stability of the hydrophilic properties for a long period of time using just the tin oxide layer.

Thus according to the present invention, by forming the overcoat layer which of a material having an opposite polarity with respect to tin oxide from the aspect of surface polarity, on the surface of the tin oxide layer, it becomes possible to obtain greater, long-term stability of the hydrophilic properties. In this regard, please refer to the Exhibit A attached hereto (previously submitted for consideration by the Examiner together with Amendment-C Under 37 CFR 1.116), including a chart and a graph comparing hydrophilic glass according to the invention with other glass samples, particularly relating to the change of contact angle after soap washing. As is readily apparent the change of contact angle with the two examples according to the invention is much less overall, as well as in rate of change, in comparison to the other glass

samples. According to the present invention, the advantageous hydrophilic properties are achieved by the surface polarity and the surface irregularities, not by the photocatalytic properties of SnO_2 , which (again) are little.

Such aspect of the invention is not achieved or suggested by Tada, who applies a silicon oxide monocomponent equivalent layer or similar layer over TiO_2 to prevent organic substances from being adhered to the TiO_2 layer because the silicon oxide monocomponent equivalent layer or similar layer "... *are nonpolar or has low polarity....*(emphasis added)" According to Tada's disclosure, the non-fogging articles comprise a glass substrate (structure) / alkali shut-off film / photocatalytic film / silicon dioxide, with a surface roughness (R_a) of 1.5 – 80 nm, a mean interval (S_m) of irregularities at 4 -300 nm, and a photocatalytic layer thickness of 10 -500 nm. Significantly, Tada does not indicate SnO_2 as a photocatalyst, and moreover, Tada again discloses that the surface irregularities of his photocatalytic film are achieved either by transfer of the surface irregularities of the alkali shut-off film through to the photocatalytic layer or by directly forming irregularities on the photocatalytic film surface, contrary to the claimed invention.

Similarly, the above important aspects of the present invention are not achieved or suggested by Komatsu, who coats a glass substrate/structure with a transparent photocatalytic layer and applies a *porous* covering layer (i.e., a porous, 150Å layer of SiO_2) over the photocatalytic layer such that the pores function as capillaries to improve the wetting property (hydrophilicity) of an object's surface. While Komatsu discusses several photocatalytic materials including SnO_2 , again, he prefers use of

TiO₂ because of its recognized superior photocatalytic properties, and it is well known that SnO₂ shows little photocatalytic properties as a practical matter, and Komatsu never discusses use of *rutile* SnO₂ as a photocatalytic film. If tin oxide is in an amorphous form, it is very difficult to form desirable surface irregularities. Moreover, it is the porous nature of Komatsu's SiO₂ covering layer that imparts the hydrophilicity to his anti-fog element, not surface irregularities transferred through from the photocatalytic layer, contrary to the present invention and to Tada.

2. *No motivation for proposed combination*

Appellant further respectfully submits that persons of ordinary skill in the art would not consider it obvious to hypothetically modify Tada's antifogging articles by simply replacing the TiO₂ photocatalytic layer with a rutile layer of SnO₂ in light of the teachings of Komatsu, as proposed by the Examiner, because the disclosures of the two references are quite distinct and provide no motivation for the specific hypothetical combination (corresponding to present claim 1).

As discussed above, the hydrophilic natures of the structures disclosed by Tada and Komatsu are achieved in distinct manners. Tada provides a silicon oxide monocomponent equivalent layer over the photocatalytic TiO₂ layer because such covering layer is nonpolar or has low polarity, and achieves desired hydrophilicity by controlling arithmetical mean roughness and mean interval between dents and projections on the surface of the covering layer within certain ranges, which is in turn achieved by special processing resulting in the photocatalytic layer having the desired characteristics that are passed through to the covering layer as deposited thereon. Quite differently, according to Komatsu, the

hydrophilic nature of his inorganic oxide (SiO_2) covering layer is achieved by depositing the layer in such a manner that it is porous, with “large projections and depressions” formed on the surface thereof. See Komatsu’s column 5, lines 55-64. Komatsu has no concern over the surface roughness of his photocatalytic layer because that is not how he achieves hydrophilicity, while the large projections and depressions formed in Komatsu’s porous covering layer are contrary to the covering layer surface parameters required by Tada.

Additionally, given that both Tada and Komatsu strongly advocate anatase type TiO_2 as the photocatalytic material in their structures, as a practical matter the references provide no motivation to substitute SnO_2 (in any form) as the photocatalytic material in Komatsu because it is recognized as possessing little photocatalytic activity.

Still further, neither of the references make any reference to *rutile* SnO_2 . Komatsu only makes reference to rutile TiO_2 , and the reference reflects negatively on such material as a photocatalyst. See Komatsu’s column 5, lines 42-53. Again, if tin oxide is in an amorphous form, it is very difficult to form desirable surface irregularities.

From all of the foregoing appellant respectfully submits that the proposed modification of Tada’s articles to include a rutile form of SnO_2 is improperly based on a suggestion coming entirely from the Examiner (as guided by impermissible hindsight of applicant’s disclosure), rather than on any teaching or suggestion which may be fairly gleaned from the references themselves.

On the other hand, appellant notes that the Courts and the Board of Patent Appeals and Interferences (BPAI) have consistently held that, for purposes of establishing obviousness under 35 USC §103, a rejection advanced by an Examiner

must rest on a factual basis, with the facts being interpreted without hindsight reconstruction of the invention from the prior art, and that the Examiner may not, because of doubts that the invention is patentable, resort to speculation, unfounded assumption or hindsight reconstruction to supply deficiencies in the factual basis. Ex Parte Hamond, 41 USPQ2d 1217, 1220, citing In re Warner, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), *cert. denied*, 389 U.S. 1057 (1968)

In this regard, appellant respectfully submits that the unobviousness of the invention of claim 1 is reflected by Tada and Komatsu because each of these references require special (although different) processing to achieve desired surface characteristics (hydrophilicity), whereas no such special processing is required with rutile SnO₂ as the photocatalyst.

3. *Other Features Not Taught or Made Obvious By the References*

Still further, appellant respectfully submits that even if the Tada and Komatsu references were hypothetically combined, any combination resulting from the full, fair teachings of these references would not achieve or make obvious several important features of the claimed invention. As discussed above, both Tada and Komatsu fail to disclose or suggest important aspects of the invention as set forth in amended claim 1, including the tin oxide having a rutile structure and the overcoat layer having a surface polarity opposite to that of tin oxide, and these references also fail to achieve or suggest the significant advantage achieved by the claimed invention.

Additionally, appellant respectfully submits that the applied references do not disclose the feature of claim 7 regarding the refractive indexes of the undercoat film, the substrate and the tin oxide layer, whereas this feature is particularly advantageous for purposes of improved transparency - appearance, as discussed at page 8 of the present specification.

Issue II. Upon careful consideration appellant respectfully traverses the Examiner's rejection of claim 8 under 35 USC §103(a), and submits that the rejected claim is clearly patentably distinct over the structures and articles disclosed in the Tada, Komatsu and Ando references, based on for those reasons discussed above (which are not overcome by any additional teaching of Ando), and because none of the applied art/references including Ando discloses or suggests use of an undercoat film formed as a layered body of tin oxide and silicon oxide, as defined in claim 8.

While Ando may disclose an undercoat film (such as a barrier layer) formed from a target having silicon oxide as a main component and another metal such as tin as a secondary component, Ando specifically forms the undercoat film as a "uniform layer" by a physical vapor deposition without breaking a vacuum. This is contrary to the undercoat film formed as layered body defined in claim 8, and further discussed in the present specification.

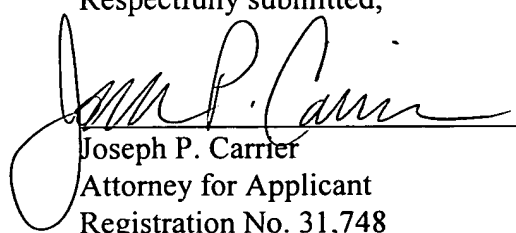
CONCLUSION

Based on all the foregoing comments, it is respectfully submitted that the Examiner has failed to establish prima facie obviousness under 35 USC §103(a) of any of claims 1, 3-10 and 12-20 on appeal. Correspondingly, appellant respectfully submits that the Examiner's rejections of the claims on appeal are in error, and a reversal of same is respectfully requested.

Appellant encloses herewith triplicate copies of the present Brief. Also enclosed herewith is a check in the amount of \$320.00 in payment of the fee for Brief on Appeal. Further, the Commissioner is hereby authorized to charge any deficiency which may be required during the entire pendency of the application, and to credit any excess paid during the entire pendency of the application, to Deposit Account 50-0744. A duplicate of this sheet is enclosed.

Favorable consideration and reversal of the final rejection are earnestly solicited.

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July 28, 2003

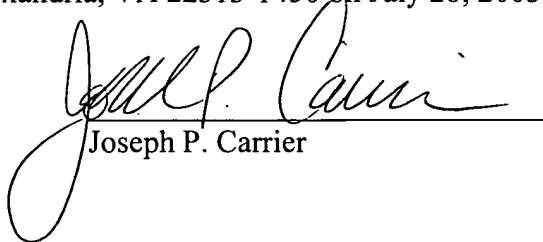
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the US Postal Service as First Class Mail, in an envelope provided with sufficient postage to Box Appeal Brief-Patents, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450 on July 28, 2003.

Dated: July 28, 2003

JPC/ms
Enclosures



Joseph P. Carrier

APPENDIX OF CLAIMS ON APPEAL*

1. A hydrophilic member comprising:
 - a tin oxide layer having a rutile structure formed on a surface of a substrate; and
 - an overcoat layer formed on the surface of said tin oxide layer, wherein said overcoat layer has a surface polarity opposite to that of tin oxide, is selected from at least one of silicon oxide, aluminum oxide, zirconium oxide, ceric oxide, and titanium oxide, and the mean surface roughness (R_a) of the top surface thereof is within a range of 0.5 to 25 nm.
3. A hydrophilic member according to claim 1, wherein the mean surface roughness (R_a) of said tin oxide layer is also within a range of from 0.5 to 25 nm.
4. A hydrophilic member according to claim 1, wherein the mean spacing (S_m) of the irregularities of the top surface of said overcoat layer is within a range of 4 nm to 300 nm.
5. A hydrophilic member according to claim 1, wherein said tin oxide layer has a thickness within a range of 10 to 800 nm.
6. A hydrophilic member according to claim 1, wherein said overcoat layer has a thickness within a range of 0.1 to 100nm.
7. A hydrophilic member according to claim 12, wherein the refractive index of said undercoat film acting as a barrier against alkali is between the refractive index of the substrate and the refractive index of the tin oxide layer.
8. A hydrophilic member according to claim 12, wherein said undercoat film is a layered body of tin oxide and silicon oxide.

9. A hydrophilic member according to claim 1, wherein said substrate is selected from the group consisting of: glass the main component of which is silicon oxide; tile; ceramic; and a metal plate.

10. A hydrophilic member according to claim 1, wherein said hydrophilic member is a mirror having a thin metal film formed on the substrate surface between the substrate and the tin oxide layer, or on an opposite surface of the substrate.

12. (Previously added) A hydrophilic member according to claim 1, further including an undercoat film disposed between the surface of said substrate and said tin oxide layer, said undercoat film acting as a barrier against alkali.

13. A hydrophilic member according to claim 12, wherein said hydrophilic member is a mirror having a thin metal film formed on the substrate surface between the substrate and the undercoat film, or on an opposite surface of said substrate.

14. A hydrophilic member according to claim 1, wherein the mean surface roughness (R_a) of said tin oxide layer is also within a range of from 0.5 to 25 nm.

15. A hydrophilic member according to claim 1, wherein the mean spacing (S_m) of the irregularities of the top surface of said overcoat layer is within a range of 4 nm to 300 nm.

16. A hydrophilic member according to claim 14, wherein the mean spacing (S_m) of the irregularities of the top surface of said overcoat layer is within a range of 4 nm to 300 nm.

17. A hydrophilic member according to claim 1, wherein said tin oxide layer has a thickness within a range of 10 to 800 nm.

18. A hydrophilic member according to claim 15, wherein said tin oxide layer has a thickness within a range of 10 to 800 nm.

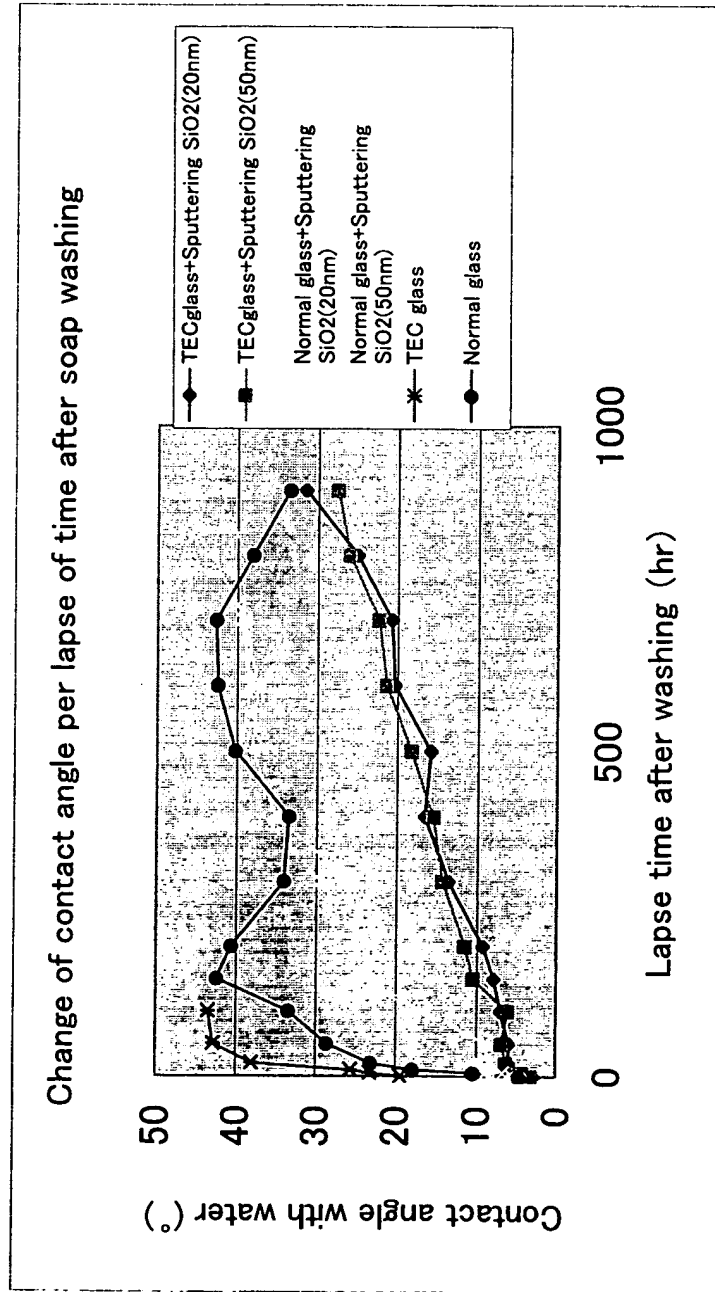
19. A hydrophilic member according to claim 16, wherein said tin oxide layer has a thickness within a range of 10 to 800 nm.

20. A hydrophilic member according to claim 1, wherein said overcoat layer has a thickness within a range of 0.1 to 100nm.

* Claims 14, 15, 17 and 20 are shown depending from claim 1, rather than cancelled claim 2, consistent with the Amendment-D Under 37 CFR 1.116 filed by applicant, which is expected to be entered in the application.

Comparison of Hydrophilic glass (Embodiment) and other glass (Comparative example) with respect to change of contact angle

	0	5	10	20	50	100	150	200	300	400	500	600	700	800	900
TECglass+Sputtering SiO ₂ (20nm)	29	5.3	6.1	6.1	6.8	6.1	7.9	9.3	13.6	16.5	15.8	20.3	20.7	25	31.5
TECglass+Sputtering SiO ₂ (50nm)	3.2	4.2	6.1	6.3	6.8	6.1	10.5	11.5	14.3	15.5	18.2	21.3	22.3	25.9	27.5
Normal glass+Sputtering SiO ₂ (20nm)	5.6	8.5	8.8	10.1	8.8	16.6	25.7	23.2	25.7	35.1	38	37.4	39.1	43.2	41.3
Normal glass+Sputtering SiO ₂ (50nm)	5.5	6.7	8.6	9.5	8.7	16.4	23.8	23.3	29.5	36.7	39.5	38.4	39.4	39	42.3
TEC glass	19.4	23.2	25.6	38	42.8	43.5									
Normal glass	4.7	10.4	17.9	23.1	28.6	33.4	42.4	40.6	34	33.4	40.2	42.4	42.6	38	33.4



EXHIBIT

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tabbles